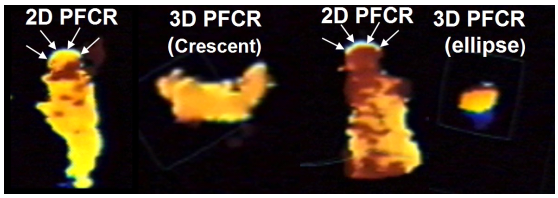
functional MR, the hemispherical assumption for PFCR frequently does not apply. The true 3D PFCR contour is more complex, tracking the contour of the elliptical orifice, and should be considered for most accurate MR quantification.

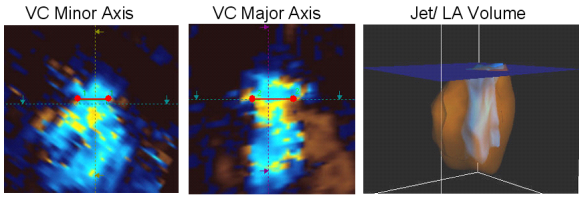


11:45 a.m.

837-6 **Real-Time Three-Dimensional Color Doppler Flow: Feasibility and Initial Quantitative Comparison With Two-Dimensional Methods**

Lissa Sugeng, Lynn Weinert, Kirk T. Spencer, Kathleen T. Furlong, Roberto M. Lang, University of Chicago, Chicago, IL

Although imaging of 3D color flow has been attempted, it is not routinely performed due to tedious acquisition and processing. A new transthoracic matrix array probe (x4, Philips) allows real-time display of color flow. Our goals were to 1) test the feasibility of transthoracic, real-time visualization of 3D color flow jets; 2) compare the 2D jet/LA area and 3D jet/LA volume ratios; 3) compare the area and shape of the vena contracta (VC) by 2D vs 3D. **Method**: 23 consecutive pts with varying severity of mitral and tricuspid regurgitation (MR, N=12; TR, N=9) were studied. From an apical window, the jet and the right/left atrium were imaged simultaneously in a 3D mode. The major and minor VC axes, regurgitant jet and right/left atrial volumes were measured (Cardio-View RT, TomTec). **Results**: 21 pts (91%) had adequate 3D images for manual tracing of regurgitant jets. The jet to atrial volume ratio was smaller than the jet to atrial area ratios in all patients (MR: 11.6±6.2 vs 32.7±9.4%; TR: 13.4±3.8 vs 44.6±16.2%). In 18/21 patients, the VC area in both MR and TR jets were larger by 3D than 2D (MR: 2.1±0.7 vs 1.5±0.4 cm^2; TR: 3.5±2.0 vs 1.5±0.6 cm^2). In both MR and TR jets, the VC by 3D had a roughly oval, rather than the previously assumed circular shape. **Conclusion**: Real-time 3D imaging of color flow jets is feasible and provides information on their extent and direction. Since 2D and 3D measurements of VC area and jet/atrial ratios differ, new reference values need to be established to assess the severity of regurgitation from 3D images.



Noninvasive Imaging

POSTER SESSION

1149 Optimal Assessment of Left Ventricular Diastolic Function and Left Atrial Size: Transthoracic Echocardiography

Tuesday, March 09, 2004, Noon-2:00 p.m.
Morial Convention Center, Hall G
Presentation Hour: 1:00 p.m.-2:00 p.m.

1149-153 **Echocardiographic Diastolic Function Grade Accurately Reflects Changes in Ventricular Wall Stress and Stiffness**

Sanderson Cauduro, Charanjit Rihal, Karen Modesto, Eric Yang, Marek Belohlavek, Stig Urheim, Jamil Tajik, Theodore Abraham, Mayo Clinic and Mayo Foundation, Rochester, MN

Background: Ventricular wall stress and stiffness have a major influence on ventricular diastolic properties. However, it is unknown whether echocardiographic diastolic function grade appropriately reflects changes in ventricular wall stress and ventricular stiffness.
Methods: Meridional ventricular wall stress and stiffness were calculated in 47 consecutive patients undergoing left heart catheterization, using invasive pressures and standard formulae. All patients underwent simultaneous echocardiography. We excluded patients with valvular or congenital heart disease, and those not in sinus rhythm. Echocardiographic diastolic function grade was determined using standard criteria.
Results: Mean age was 65 ± 9 years with 69% males. Comorbidities in this population included: congestive heart failure (10%), diabetes (36%), hypertension (55%) and obstructive coronary artery disease (56 %). Left ventricular mass was similar in all groups. Univariate regression analyses showed that diastolic function grade correlated with wall stress (r = 0.52) and stiffness (r = 0.71). Multivariate analyses showed a persistent correlation after adjustment for the comorbidities
Conclusion: Echocardiographic grade of diastolic function reflects ventricular wall stress and stiffness, independent of left ventricular hypertrophy and comorbidities

	Normal diastolic function (n=3)	Abnormal relaxation (n=17)	Pseudonormal (n=22)	Restrictive (n=5)	p value
Wall stress (10^3dyn/cm^2)	34 ± 11	48± 19	66± 25	85± 34	0.004
Stiffness (mmHg/ml)	0.13± 0.08	0.1± 0.06	0.14± 0.01	0.3 ± .0.02	<0.0001
tau (ms)	55 ± 10	49± 15	54± 11	52 ± 10	NS
LV mass/BSA (g/m2)	85 ± 16	88± 23	101 ± 23	111± 29	NS
Deceleration time (ms)	200± 32	253± 63	228± 51	160± 21	0.006
E/A ratio	1.2± 0.2	0.7± 0.1	1.1± 0.4	1.3± 0.5	<0.0001

1149-154 **The Ratio of Transmitral E Velocity to Early Diastole Velocity of the Mitral Annulus Is Associated With B-Type Natriuretic Peptide Levels**

Osamu Wada, Takuya Inoue, Hideyuki Sakai, Makoto Suzuki, Kaoru Sugi, Toho University Ohashi Hospital, Tokyo, Japan

Background: Noninvasive assessment of diastolic dysfunction by Doppler echocardiography confuses because of the variation in mitral inflow velocity. On the other hand, it is reported that mitral annulus velocity by tissue Doppler is useful for identifying left ventricular diastolic dysfunction. As previously reported, plasma B-type natriuretic peptide (BNP) levels are a strong marker of left ventricular dysfunction. The aim of this study is whether what index by echocardiography correlates closely to serum BNP levels.
Methods: We referred forty-three consecutive patients with systolic dysfunction (ejection fraction <0.55, mean0.42±0.11) except atrial fibrillation. The common parameters by routine echocardiography were obtained by conventional methods, together with measurement of plasma brain natriuretic peptide levels. We measured the index as follows; left atrium dimension, left ventricular diastole dimension (LVDd), left ventricular systole dimension (LVDs), fractional shortening, mitral E and A velocity, deceleration time of E wave. Furthermore, mitral annulus velocity profile by pulsed tissue Doppler was obtained and also analyzed in all patients. Peak velocities in systole (Sa), early diastole (Ea), late diastole, and the E/Ea ratio were calculated at both corners of the mitral annulus.
Results: There were significant correlation with serum BNP levels in E/Ea (r=0.65, p<0.0001), LVDs (r=0.62, p<0.0001), fractional shortening (r=-0.53, p<0.0001), LVDd (r=0.48, p<0.002). But no significant correlation was observed in E/A (r=0.200), deceleration time (r=-0.308), left atrium dimension (r=0.383), Sa (r=-0.174) with BNP levels.
Conclusion: These data suggested that E/Ea measured by tissue Doppler echocardiography was associated with plasma BNP levels similar to LVDs and FS. Thus, this easily obtained index by tissue Doppler echocardiography was useful for identifying the patients with heart failure.
o:p>

1149-155 **Which Echo-Doppler Left Ventricular Diastolic Function Measurements Should Be Made in the Clinical Echo Laboratory?**

Shahabuddin Khan, Renee L. Bess, Howard S. Rosman, Cheryl K. Nordstrom, Gerald I. Cohen, Julius M. Gardin, St. John Hospital and Medical Center, Detroit, MI

Background: Doppler trans-mitral valve (MV) and pulmonary vein (PV) flow parameters, and more recently-described color M-mode flow propagation velocity (Vp) and tissue Doppler imaging (TDI) of MV annular motion, are useful in characterizing LV diastolic function. However, the incremental utility of each measurement depends greatly upon its obtainability and inter-reader variability (IRV).
Methods: Latest generation equipment was used to record these parameters in 80 inpatients with suspected LV dysfunction. All pts were age >50 years (mean 69). Five readers independently measured each parameter for the first 25 pts. The time taken by the sonographer, recording success rate and IRV for these measures were calculated.
Results: Recording success was high (>98%) for MV flow, Vp and TDI. PV flow had the lowest recording success rate (PV A velocity 46%, PV A duration 48%, PV S velocity 73%, and PV D velocity 84%). Key results for IRV are shown.